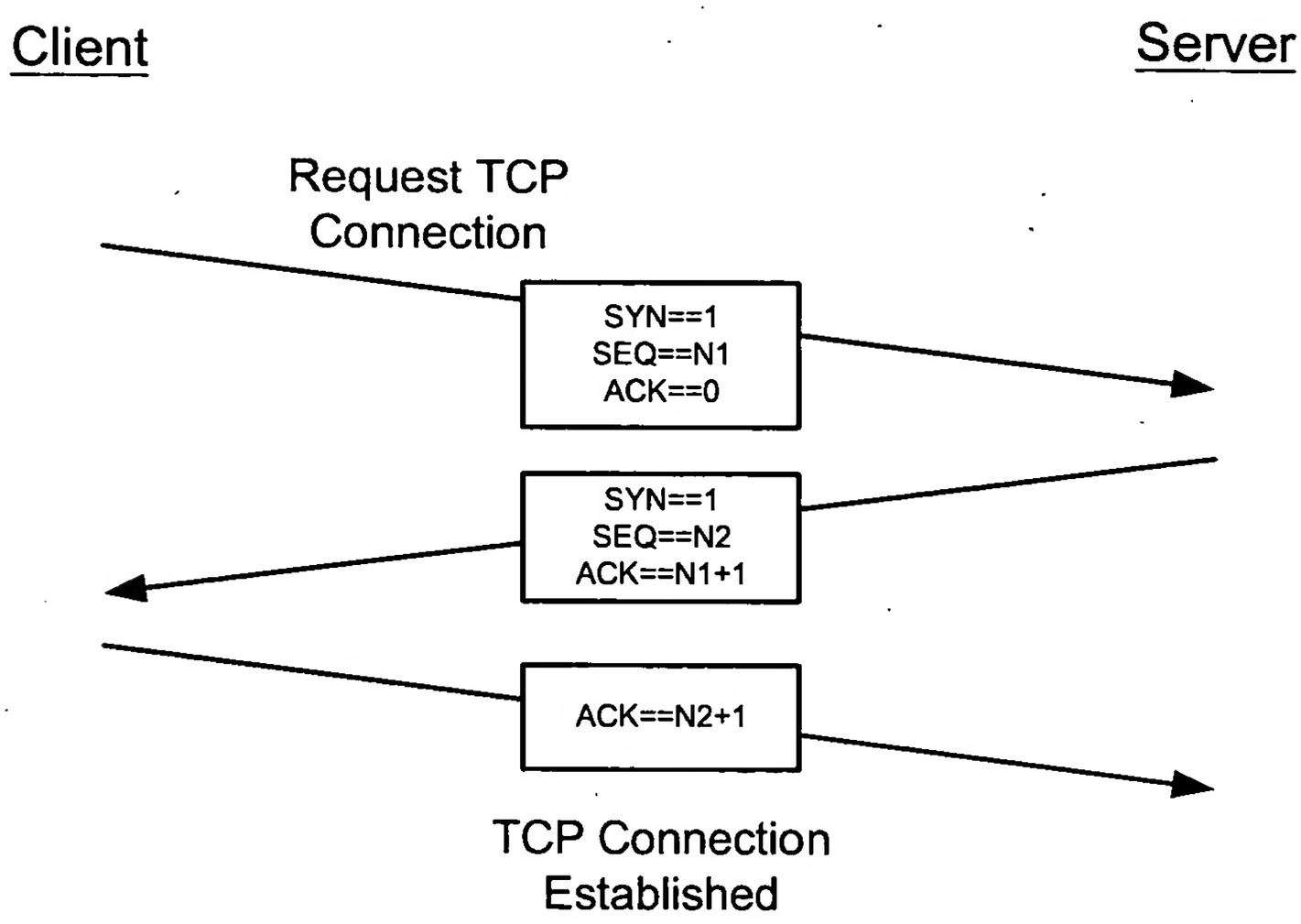

Prior Art

Fig. 1

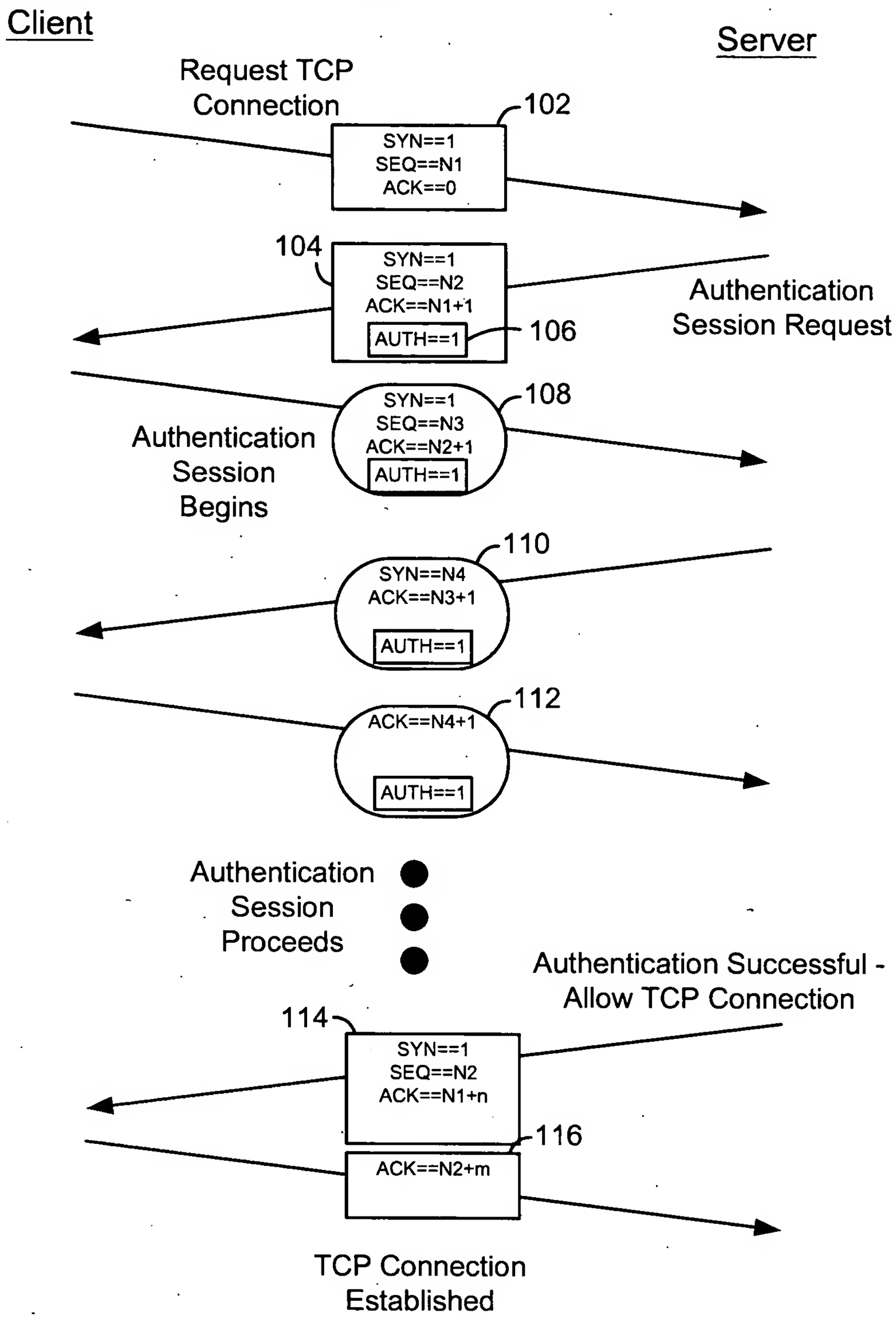
Client
Server
Request TCP Connection
102
SYN==1
SEQ==N1
ACK==0
104
SYN==1
SEQ==N2
ACK==N1+1
AUTH==1
106
Authentication Session Request
Authentication Session Begins
108
SYN==1
SEQ==N3
ACK==N2+1
AUTH==1
110
SYN==N4
ACK==N3+1
AUTH==1
112
ACK==N4+1
AUTH==1
Authentication Session Proceeds
Authentication Successful - Allow TCP Connection
114
SYN==1
SEQ==N2
ACK==N1+n
116
ACK==N2+m
TCP Connection Established

Fig. 2

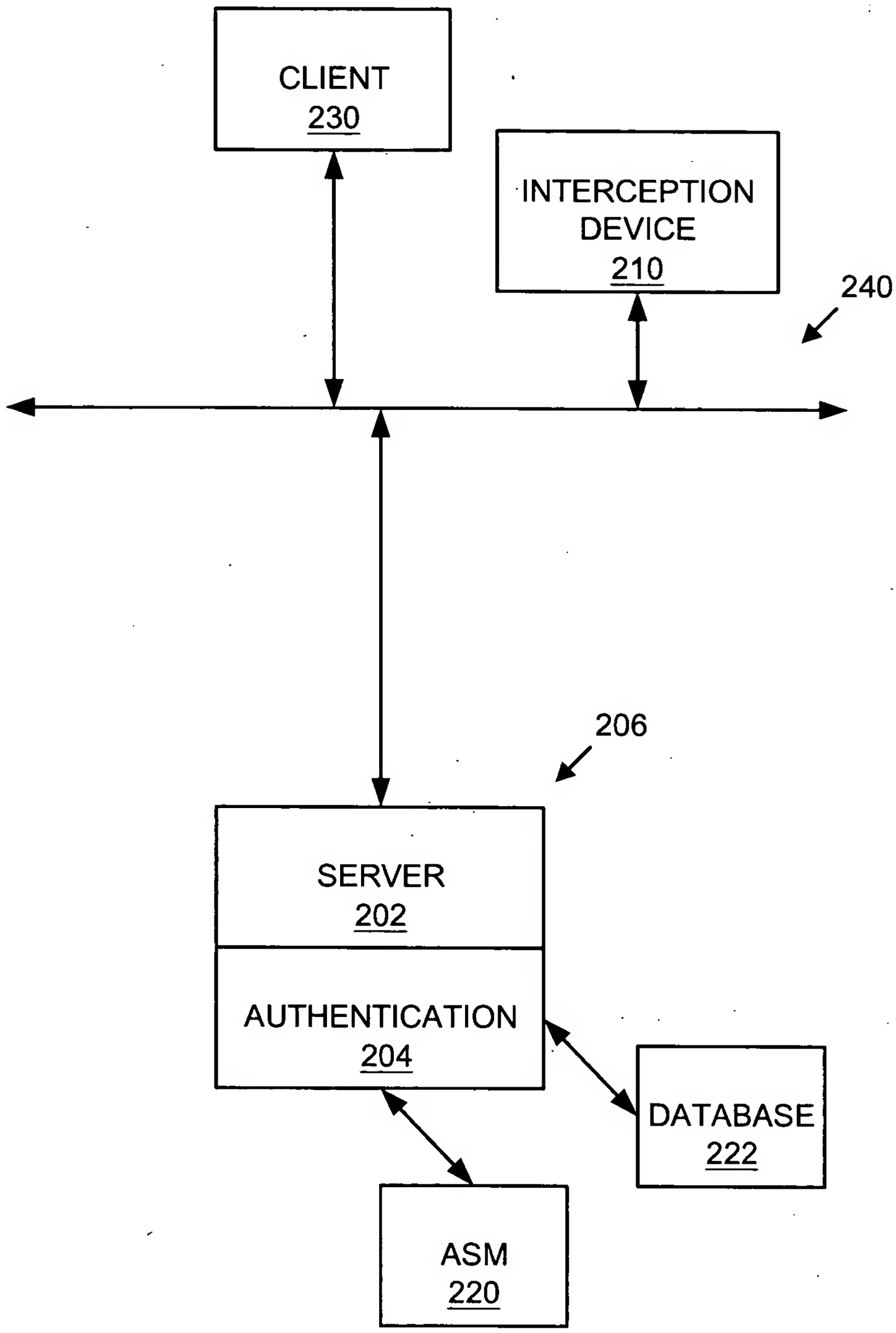
CLIENT
230
INTERCEPTION
DEVICE
210
240
206
SERVER
202
AUTHENTICATION
204
DATABASE
222
ASM
220

Fig. 3

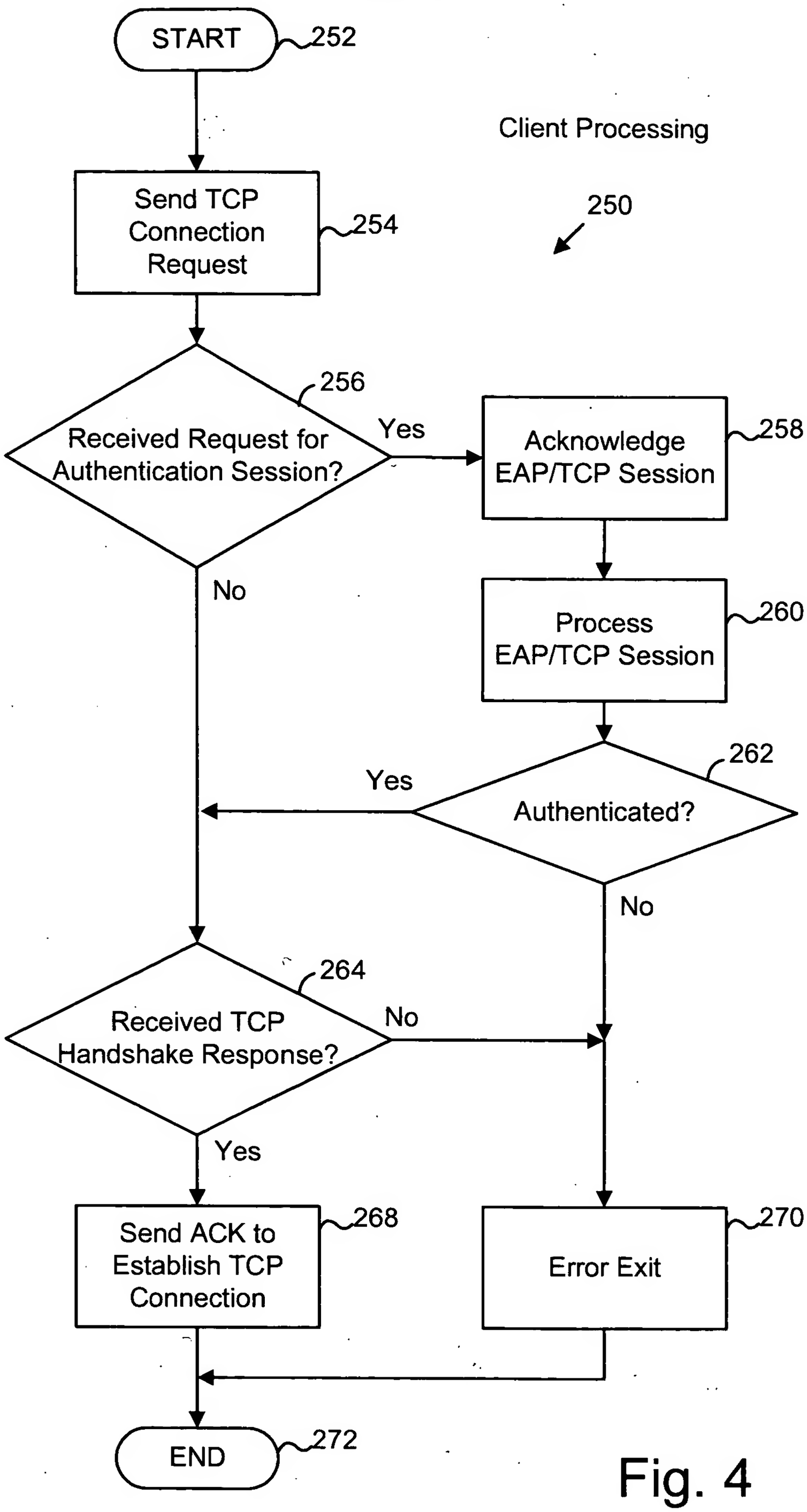
START
252
Client Processing
250
Send TCP Connection Request
254
Received Request for Authentication Session?
256
Yes
No
Acknowledge EAP/TCP Session
258
Process EAP/TCP Session
260
Authenticated?
262
Yes
No
Received TCP Handshake Response?
264
No
Yes
Send ACK to Establish TCP Connection
268
Error Exit
270
END
272

Fig. 4

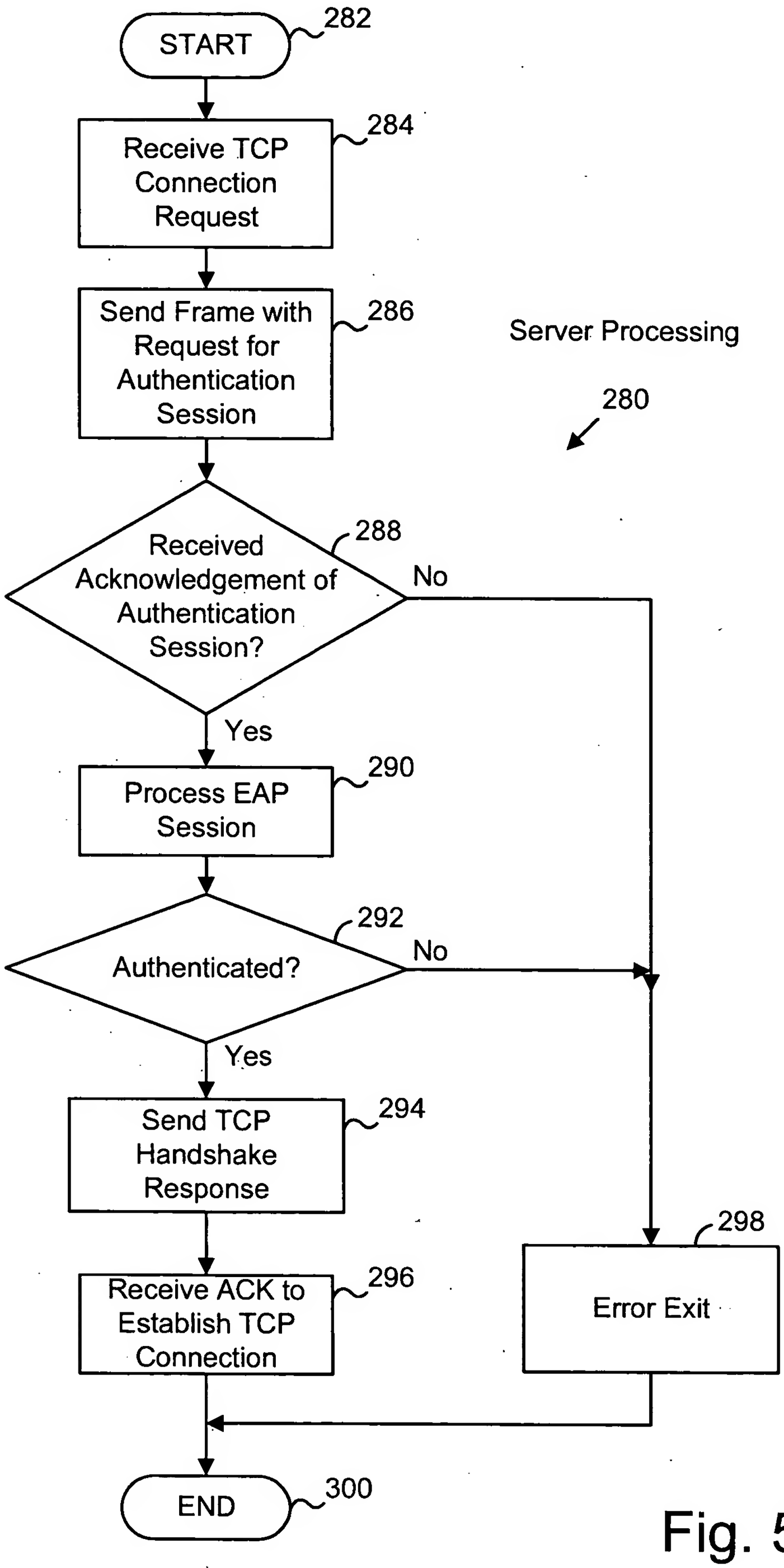
Server Processing
280
START
282
Receive TCP Connection Request
284
Send Frame with Request for Authentication Session
286
Received Acknowledgement of Authentication Session?
288
No
Yes
Process EAP Session
290
Authenticated?
292
No
Yes
Send TCP Handshake Response
294
Receive ACK to Establish TCP Connection
296
Error Exit
298
END
300

Fig. 5

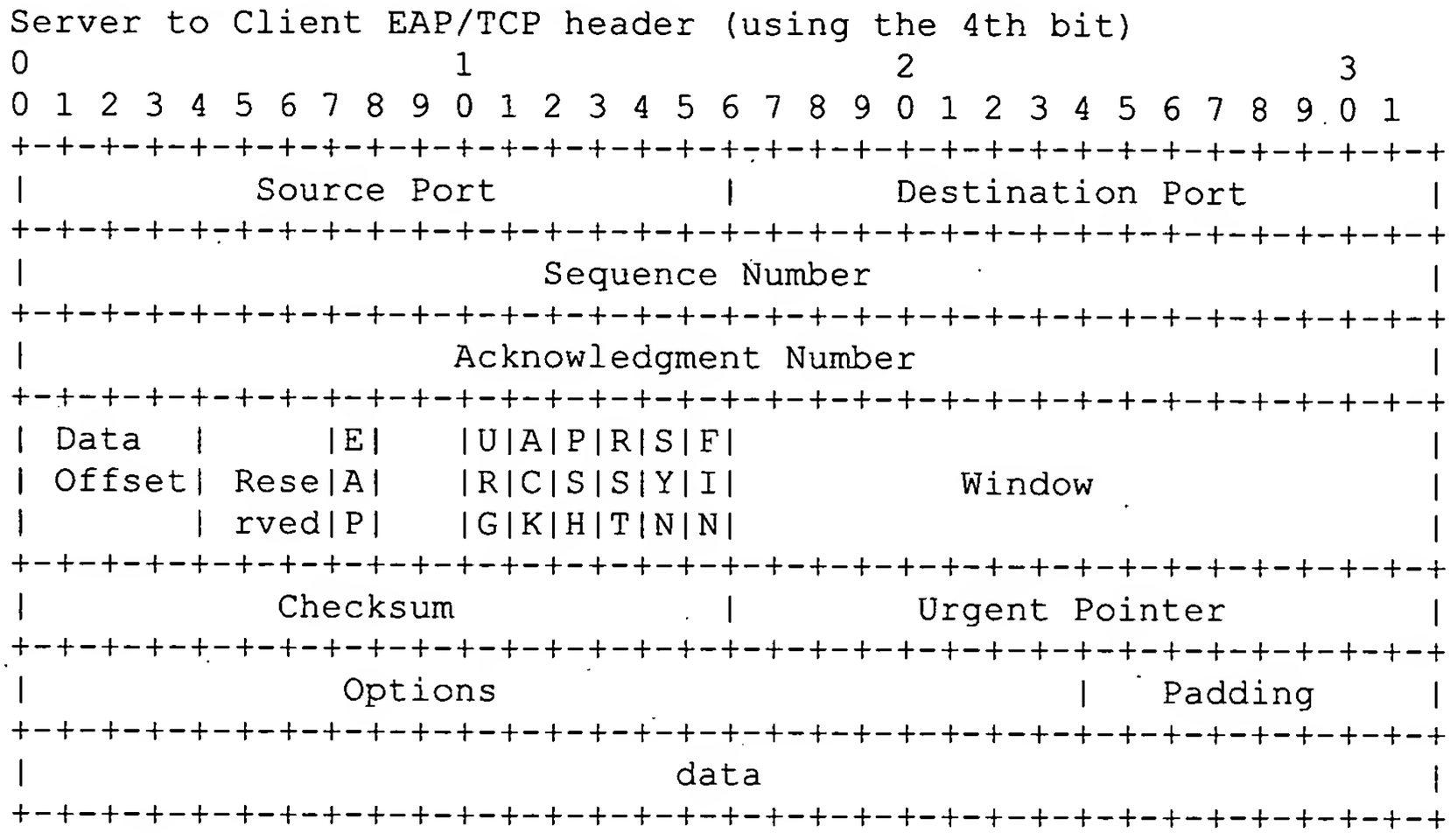
Server to Client EAP/TCP header (using the 4th bit)
0 1 2 3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
Source Port
Destination Port
Sequence Number
Acknowledgment Number
Data Offset
Rese rved
EAP
URG
ACK
PSH
RST
SYN
FIN
Window
Checksum
Urgent Pointer
Options
Padding
data

Fig. 6

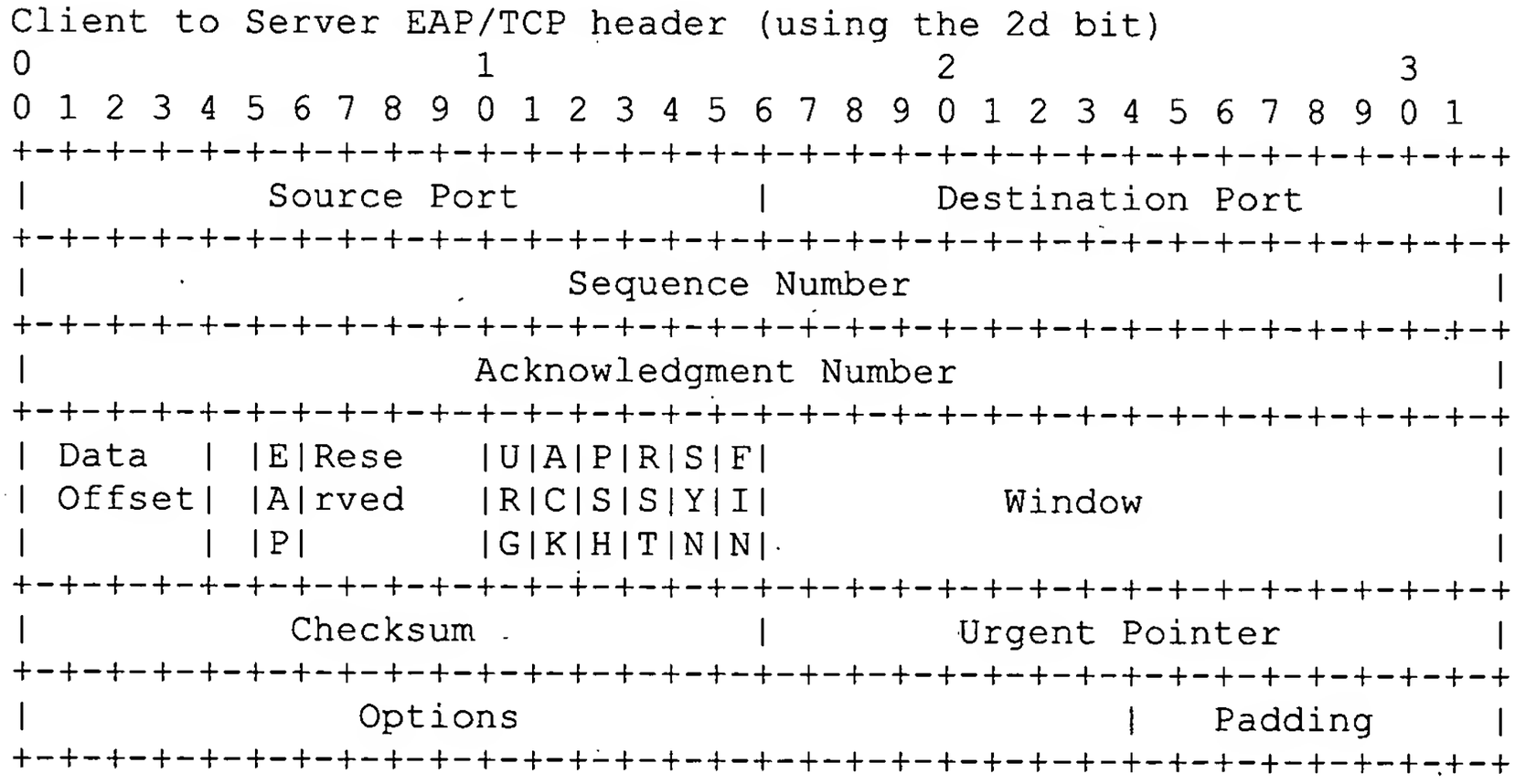
Client to Server EAP/TCP header (using the 2d bit)
0 1 2 3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
Source Port
Destination Port
Sequence Number
Acknowledgment Number
Data Offset
EAP
Rese rved
URG
ACK
PSH
RST
SYN
FIN
Window
Checksum
Urgent Pointer
Options
Padding

Fig. 7

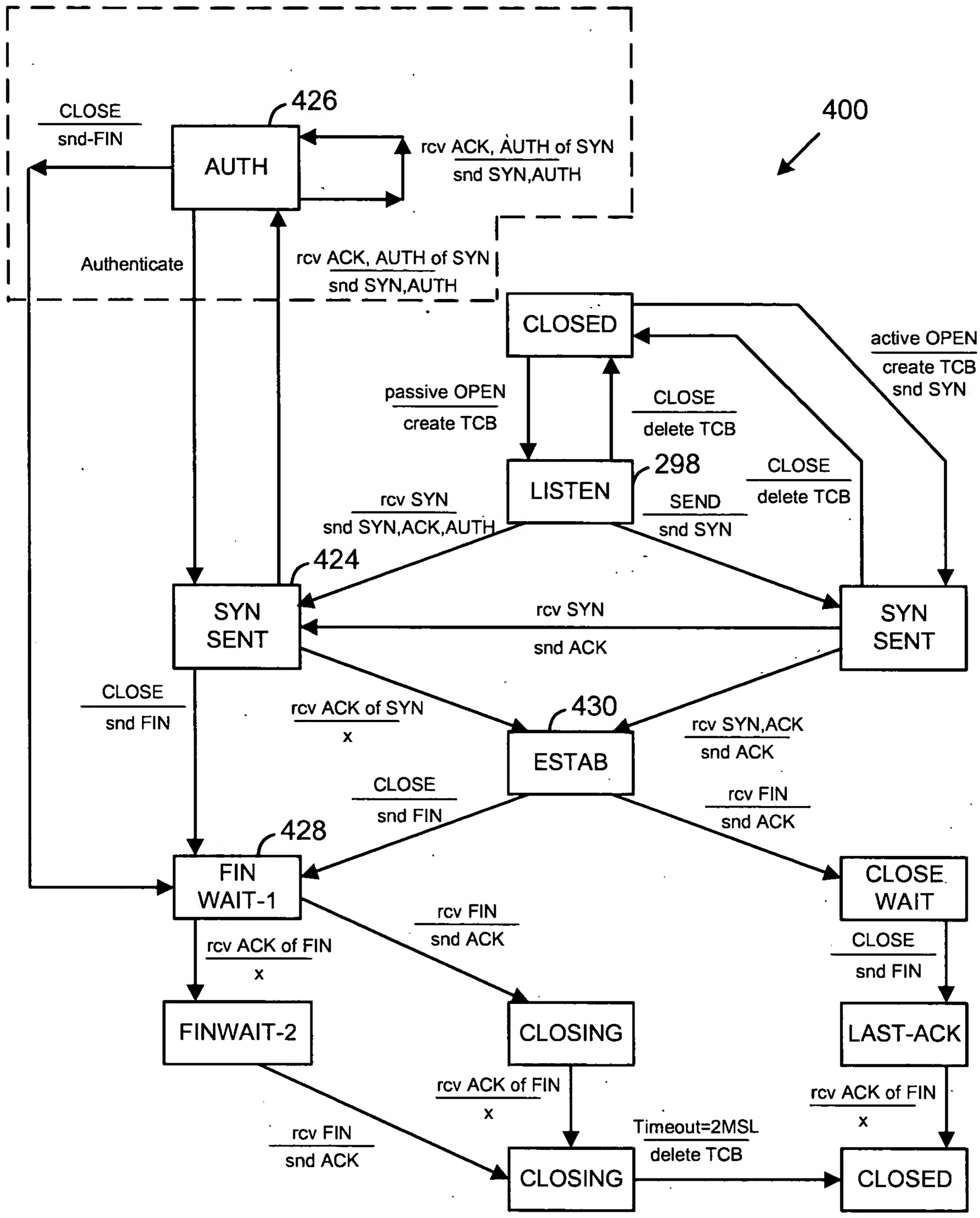
400
426
CLOSE
snd-FIN
AUTH
rcv ACK, AUTH of SYN
snd SYN,AUTH
Authenticate
rcv ACK, AUTH of SYN
snd SYN,AUTH
CLOSED
active OPEN
create TCB
snd SYN
passive OPEN
create TCB
CLOSE
delete TCB
298
LISTEN
CLOSE
delete TCB
rcv SYN
snd SYN,ACK,AUTH
SEND
snd SYN
424
SYN SENT
rcv SYN
snd ACK
SYN SENT
CLOSE
snd FIN
rcv ACK of SYN
x
430
ESTAB
rcv SYN,ACK
snd ACK
CLOSE
snd FIN
rcv FIN
snd ACK
428
FIN WAIT-1
CLOSE WAIT
rcv FIN
snd ACK
rcv ACK of FIN
x
CLOSE
snd FIN
FINWAIT-2
CLOSING
LAST-ACK
rcv ACK of FIN
x
rcv ACK of FIN
x
rcv FIN
snd ACK
Timeout=2MSL
delete TCB
CLOSING
CLOSED

Fig. 8